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**POSITIONING ACCESSORY FOR
CAMERA-EQUIPPED WIRELESS
TERMINALS**

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5 **POSITIONING ACCESSORY FOR CAMERA-EQUIPPED WIRELESS TERMINALS**

BACKGROUND

The present invention relates generally to accessories for wireless communication devices, and more particularly to accessories for wireless communications devices having integrated cameras.

10 Traditional chemical film and digital cameras have the ability to connect to a tripod. The tripod allows multi-axis movement of the camera such that the camera may be tilted or turned at any desired angle. Because the tripod presents a stabilizing base for the camera, the photographer is free to engage in activities such as hands-free photography, long-exposure photography, and remote photography.

15 Many wireless communications devices, such as cell phones and Personal Digital Assistants (PDAs), come equipped with an integrated digital camera. Others are capable of connecting to a separate camera accessory. However, the size, fragility, and the aesthetic restrictions imposed by manufacturers on these devices, prohibit the inclusion of stabilizing structures in or on the wireless communications
20 device. Further, conventional devices lack the ability to maneuver through one or more degrees of freedom, and thus, may only take pictures of objects or people that lie in direct sight of the lens. As a result, photography with wireless communications devices is limited. Therefore, there is a need for a compact accessory for a camera-equipped wireless communications device capable of providing multi-axis positioning
25 control, and compatible to interface with a traditional tripod.

SUMMARY OF THE INVENTION

The present invention is a stand specially designed for a camera-equipped wireless communications device. One embodiment of the stand comprises a
30 supporting base, an adjustable terminal support movably mounted to the base, and an auxiliary system connector mounted to the base. The adjustable terminal support supports the wireless communications device and allows positional adjustment of the

5 device. The adjustable terminal support includes a system plug that connects to a
system interface on the camera-equipped wireless communications device. The
auxiliary system connector connects a peripheral device, for example, a flash unit, to
the base. A system bus extends through the base to interconnect the system plug
and the auxiliary system connector allowing the camera-equipped wireless
10 communications device to be connected to the peripheral device.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates one embodiment of the present invention.

Figure 1A illustrates an alternate embodiment of the present invention.

15 Figure 2 is a side view that illustrates multi-axis control according to one
embodiment of the present invention.

Figure 3 is a front view that illustrates multi-axis control according to one
embodiment of the present invention.

Figure 4 is a front view that illustrates one embodiment of the present
20 invention mounted on a tripod.

Figures 5A-5B illustrate another embodiment of the present invention.

Figure 6 illustrates an alternate embodiment of the present invention
illustrated in Figures 5A-5B.

Figure 7 illustrates another alternate embodiment of the present invention.

25 Figure 8 illustrates the embodiment of Figure 6 mounted on a tripod.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, a stand according to one embodiment of the
present invention is shown therein and indicated generally by the number 10. Stand
30 10 is specially designed for a camera-equipped mobile communications device 40,
which permits a user to capture still and/or video images, as well as to communicate
with a remote party via a wireless communications network. Mobile communications

5 device 40 may be a Personal Digital Assistant (PDA), or other wireless
communications device equipped with camera functionality. Device 40 comprises a
display 42, a camera lens 44, a keypad 46, a system interface 48, and a transceiver
and an antenna (not shown) to facilitate wireless communications with a remote
party. Display 42 acts as a viewfinder, and permits users to view images captured
10 through camera lens 44. Keypad 46 allows the user to control the functionality of
device 40, including camera functionality, and system interface 48 facilitates a
connection with any number of desired accessories.

As seen in Figure 1, stand 10 comprises a base 12 with an auxiliary system
connector 16, an adjustable terminal support 14 with a system plug 20, and a system
15 bus 18 that electrically connects the auxiliary system connector 16 to the system plug
20. Base 12 has a relatively wide and flat-bottom surface that, when placed on a
support surface, stabilizes device 40. The top of base 12 includes a socket 26 to
receive the adjustable terminal support 14. The front portion of base 12 includes an
auxiliary system connector 16 for connecting peripheral devices, as will be described
20 in more detail later.

Adjustable terminal support 14 includes a ball-member 22 that is received in
the socket 26 in base 12. The ball-member 22 pivots about a vertical axis as well as
provides front-to-back and side-to-side rotational movement for device 40. A shaft 28
connects a system plug 20 to ball-member 22. In one embodiment, shaft 28 is a
25 telescoping shaft that allows the user to raise and lower device 40. System plug 20
connects to system interface 48 on device 40, and includes one or more contacts 24
that mate with one or more corresponding contacts in system interface 48 when
device 40 is connected to system plug 20.

It should be understood that adjustable terminal support 14 might comprise
30 mechanisms other than the ball-and-socket type mechanism shown in the figures.
For example, in one embodiment, adjustable terminal support 14 may comprise a
flexible tube or gooseneck type shaft fixedly mounted to base 12. In another

5 embodiment, adjustable terminal support 14 comprises an articulating arm. As those skilled in the art will realize, other mechanisms may be equally as suitable, so long as they provide multi-axis control to device 40 and allow movement to any desired angle.

 System bus 18 passes through the interior of adjustable terminal support 14
10 and base 12 and interconnects system plug 20 and auxiliary system connector 16. Routing system bus 18 in this manner reduces the possibility of entanglement, connects wires, and facilitates an aesthetically pleasing appearance. System bus 18 comprises one or more wires or cables that provide an electrical pathway for communicating electrical signals between system plug 20 and auxiliary system
15 connector 16, such as data, synchronization signals, and power. In one embodiment, system bus 18 comprises a ribbon cable that forms a straight-through connection between the contacts 24 of the system plug 20 and auxiliary system connector 16. While not required, the configuration of auxiliary system connector 16 may be the same as the configuration of system interface 48 on device 40. This
20 allows device 40 to communicate with a peripheral device connected to auxiliary system connector 16 as if the peripheral device were plugged directly into the system interface 48. That is, whatever signals are normally communicated between device 40 and an associated peripheral device when they are directly connected may be communicated over system bus 18.

25 As previously mentioned, auxiliary system connector 16 allows peripheral devices to be connected to device 40 via system bus 18. The figures illustrate the peripheral device as being a flash accessory 50, however, any accessory capable of connecting to system interface 48 may connect to auxiliary system connector 16. For example, flash accessory (50) may comprise a separate camera and flash accessory
30 used by devices that do not include integrated cameras. Auxiliary system connector 16 comprises one or more contacts that correspond to one or more pins on interface 52 of flash accessory 50. Conventionally, interface 52 of flash accessory 50

5 connects to system interface 48 of device 40 so that signals may be communicated between the two. In this embodiment, those signals are passed over system bus 18. Thus, when the user snaps a picture, for example, device 40 may transmit a signal over system bus 18 to activate a flash accessory 50.

Alternatively, as seen in Figure 1A, auxiliary system connector 16 may
10 comprise a structure similar to that of adjustable terminal support 14. In particular, auxiliary system connector 16 may be disposed on one end of adjustable support 17. Thus, auxiliary system connector 16 may pivot about a vertical axis as well as provide front-to-back and side-to-side rotational movement for flash accessory 50.

In a preferred embodiment, stand 10 also includes a power cord 30 that
15 connects stand 10 to an external power source (not shown), such as an external AC/DC converter. Alternatively, the AC/DC converter may be integrated into base 12. Thus, stand 10 might comprise, for example, a charging unit that charges the batteries of device 40 and/or flash accessory 50, and provides power. Like the system bus 18, power cord 30 is contained mostly within the interior of adjustable
20 terminal support 14 and base 12 for aesthetic reasons and to prevent entanglement.

In use, the user may place stand 10 on a table or other suitable surface in order to capture still and/or video images. In particular, the user simply connects the system interface 48 of device 40 to system plug 20. The user may also connect interface 52 of flash accessory 50 to auxiliary system connector 16 if additional light
25 is needed. The user then adjusts device 40 to a desired position by extending the telescoping shaft and/or moving adjustable terminal support 14 to the desired position. Some of these possible movements are shown in Figures 2 and 3. For example, the user may pivot device 40 about a vertical axis, as well as front-to-back and side-to-side. Moreover, the user may move device 40 to any position permitted
30 by adjustable support 14. Once positioned, the user activates the camera via the keypad or a separate remote control (not shown). Device 40 then activates flash

5 accessory 50 by sending a signal via system bus 18, and operates lens 44 to capture the image.

Figure 4 illustrates an alternate embodiment of the present invention for settings that are absent a table or desk or other stable support surface for base 12. Specifically, stand 10 may be mounted to a tripod 60 that includes a platform 62
10 having a flat surface and a mechanical fastener, for example, a threaded bolt. The threads on the bolt correspond to the threads machined into a threaded receptacle 32 disposed in the bottom of base 12. To secure stand 10 to tripod 60, the user simply aligns receptacle 32 with the bolt and screws base 12 to platform 62. Once mounted to the tripod 60, the user may connect device 40 and flash accessory 50
15 and position them as previously described. Thus, stand 10 may be used in both indoor and outdoor situations.

Figures 5A and 5B illustrate an alternate embodiment of the present invention wherein adjustable terminal support 14 includes a universal cradle 70 that clamps device 40 regardless of the shape, size, or manufacturer of device 40. Cradle 70
20 comprises a pair of arms 72a, 72b, a housing 74, a locking lever 76 connected to a movable gear 80, and a retractable pawl 86 slidably connected to housing 74. Threaded receptacle 32 is disposed in the bottom of post 78 to mate cradle 70 to tripod 60.

At least one of the pair of arms 72 is adjustable into and out of housing 74,
25 and includes a plurality of teeth 90 that are engaged by locking teeth 88 on retractable pawl 86. In the embodiment of Figures 5A-5B, arm 72a is adjustable, while arm 72b is connected to housing 74. However, those skilled in the art will appreciate that both arms 72a, 72b may be adjustable. The arms 72 are typically rigid, but may also be constructed of a semi-flexible material to clamp the housing of
30 device 40. In one embodiment, arms 72 are rigid, but covered in a rubberized material. The rubberized material protects the housing of device 40 from being scratched, and may be compressible to facilitate a positive grip on device 40.

5 Locking lever 76 connects to gear 80 via axle 82, which in turn, is rotatably
connected to housing 74. One or more gear teeth 84 on gear 80 mesh with one or
more corresponding gear teeth on retractable pawl 86. Moving locking lever 76 from
the locked to the unlocked position (or vice versa) rotates gear 80 and slides
retractable pawl 86 back and forth. As retractable pawl 86 slides back and forth,
10 locking teeth 88 engage/disengage corresponding teeth 90 on arm 72a to lock/unlock
arm 72a. Thus, a user may clamp device 40, regardless of its size or shape, simply
by placing device 40 between arms 72a and 72b, and moving locking lever 76 to the
locked position.

 It should be understood that while the embodiment of Figure 5A is designed
15 to mate with tripod 60, it is not so limited. For example, Figure 6 illustrates an
alternate embodiment much like the embodiment of Figure 1. As in Figure 1, system
plug 16 connects to system interface 48, and flash accessory 50 connects to auxiliary
system connector 16. Thus, whether mated to base 12 or tripod 60, cradle 70 may
be moved in one or more degrees of freedom.

20 In another alternate embodiment shown in Figures 7 and 8, stand 10
comprises only the adjustable support terminal 14, system plug 16, and threaded
receptacle 32. This embodiment is a compact embodiment that allows a user who
may already own tripod 60 to take full advantage of any positioning functionality
already present on tripod 60. In this embodiment, the user connects system plug 16
25 to system interface 48, and mounts stand 10 to tripod 60 by mating the threaded
receptacle 32 with the existing mechanical fastener attached to platform 62. Once
connected, the user adjusts the positional controls of tripod 60 to position the height
and angle of device 40.

 Alternatively, stand 10 may be configured to mate with tripods that do not
30 have threaded mechanical fasteners included with them. For example, the
embodiment of Figure 6 may fit in a recess (not shown) in platform 62, and clamped
securely to the platform 62. Those skilled in the art will appreciate that various

- 5 tripods have various mechanisms by which to secure a camera or video device, and
stand 10 may be constructed to mate with any of those mechanisms.

The present invention may, of course, be carried out in other ways than those specifically set forth herein without departing from the essential characteristics of the invention. Accordingly, the present embodiments are to be considered in all respects
10 as illustrative and not restrictive, and all changes coming within the meaning and
equivalency range of the amended claims are intended to be embraced therein.